

## **Prosjektoppgave**

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### **Cataract surgery in children under the age of 1 year with or without IOL**

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**Purpose:** To evaluate (postoperative) complications in children under the age of 1 year having cataract surgery with or without IOL implantation.

**Setting:** Department of Ophthalmology of Oslo, Norway.

**Methods:** This retrospective analysis comprised 55 eyes of 35 patients under the age of 1 year, who had cataract surgery with or without implantation of an intraocular lens (IOL). The lens was approached through pars plana or limbus. An AcrySof® lens was implanted in the capsular bag. The records from follow-up visits at the Department of Ophthalmology were used for analysis.

**Main outcomes:** Secondary glaucoma and visual axis opacification (VAO).

**Results:** Significantly fewer eyes were operated on for secondary glaucoma if they had cataract surgery with implantation of an IOL ( $P < 0,02$ ). However, significantly more children were operated on for VAO if they had received an IOL at primary cataract surgery ( $P < 0,00$ ).

**Conclusion:** In children under the age of 1 year, implantation of an IOL at cataract surgery reduces the risk of developing secondary glaucoma. However, IOL implantation leads to more VAO operations.

## *Introduction*

Congenital cataract is the most common cause of treatable childhood blindness (Zetterstrom and Kugelberg 2007). Surgery before 2 months of age is crucial to achieve good visual outcome (Zetterstrom and Kugelberg 2007). Modern surgical techniques and improved IOLs have enhanced the visual outcome, but complications such as visual axis opacification (VAO) and glaucoma is still a problem in the youngest patients (Zetterstrom and Kugelberg 2007).

We have looked retrospectively over 4 years; in which technique has been changed from a posterior (pars plana) without IOL to an anterior (limbal) approach with IOL implantation. Our aim was to evaluate secondary glaucoma and VAO in children under the age of 1 year having cataract surgery with or without IOL implantation.

## **Patients and Methods**

Between 2003 and 2008, 35 children younger than 1 year of age had cataract surgery (by 5 surgeons, 3 that operated without IOL and 2 that operated mostly with IOL) at Ullevål University Hospital, Oslo, Norway. The mean age of the patients at the time of cataract surgery was 10,6 weeks (range 2-44 weeks). Of the children with bilateral cataract who had surgery in both eyes, both operated eyes were included in this study. 18 children (27 eyes) received an IOL. Their median age was 13,2 weeks (range 2 to 44 weeks). 17 children (28 eyes) were left aphkic. Their median age was 8,03 weeks (range 2,0 to 20 weeks).

Summary of patient data

	IOL	No IOL	P-value
Number of pat./eyes	18/27	17/28	
Median age (weeks)	13.20	8.03	0.34689

Sex m/f	11/7	11/6	
Follow up (months)	12.00	23.90	0.128958

**Table 1.** Number of patients, number of eyes, median age, sex and follow up time.

All children had general anaesthesia. Pupils were dilated with cyclopentolate.

In 22 eyes without IOL, the lens was approached through the pars plana.

In 27 eyes who received IOLs and 6 eyes who did not receive IOLs, the lens was approached through the limbus with anterior and posterior rexis and dry anterior vitrectomi (table 2).

After surgery, the children received dexamethasone 0,1% eyedrops 8 to 10 times per day and tapered over 2-3 months. Mydriatic drops were administered for several weeks after surgery.

Lifurox 0,1 ml or Cefuroxim 0,1 ml was injected intracameral after surgery.

IOL at surgery		
	Yes	No
Pars plana approach	0	22
Limbal approach	27	6

**Table 2.** Operation technique. The figures in the table are the number of eyes.

Postoperative examinations were performed at Ullevål University Hospital. The median follow-up was 12 months (range 0 to 36 months) in the IOL group and 23,9 months (range 0 to 63 months) in the non-IOL group. The results were analysed using the two-tailed Fisher exact test and Mann-Whitney U test.

## Results

We defined and counted secondary glaucoma when the patient had surgery for it with an Ahmed shunt. Significantly more eyes had surgery for secondary glaucoma with an Ahmed shunt if they did not have an IOL at the time of cataract surgery ( $P<0,02$ ) (Table 3).

Statistically significantly more eyes had surgery for VAO if they received an IOL at primary cataract surgery ( $P<0,00$ ), compared to the aphakic group (Table 3). After-cataract surgery was performed 27 times on 27 eyes with IOL, and 8 times on 28 eyes without IOL.

	IOL	No IOL	p-value
Number of eyes in the study	27	28	
Ahmed shunt	1	8	0.0248
Number of interventions for VAO	27	8	0.0000

**Table 3.** Number of patients having Ahmed shunt. Number of interventions for VAO.

The time from primary intervention to implantation of Ahmed was 5,0 months (one patient) in the IOL group and 3,6 months (range 0,75 to 8,50 months) in the aphakic group.

The mean time from primary cataract surgery to surgery for VAO was 4,7 months (range 1,1 to 11 months) for the IOL group and 10,9 months (range 1 to 30,8 months) for the aphakic group ( $P= 0,42$ ).

## Discussion

The present study has found a reduced incidence of secondary glaucoma when an IOL is implanted in the infant eye. This is in accordance with earlier studies (O'Keefe et al. 2001).

In an earlier study it was found that glaucoma requiring trabeculectomy developed particularly in infants who had their cataract extraction very early (Trivedi et al. 2006).

Glaucoma development was not more common in infants operated on for after-cataract (Lundvall and Zetterstrom 1999). Vasavada et al. found in a recent study on infant eyes with microphthalmos, secondary glaucoma in 30% of eyes when left aphakic (Vasavada et al. 2009).

However in the aphakic new-borne rabbit a significant relationship between the amount of after-cataract and the development of secondary glaucoma was found (Kugelberg et al. 2000).

We also found that implantation of an IOL increases the number of eyes developing VAO.

Infantile IOL implantation is becoming increasingly accepted. A main problem in aspect of VAO is lens epithelial cells formation, which is heavy in children, especially the youngest.

In an earlier study Marcantonio & Vrensen 1999 found that to reduce opacification of the visual axis after surgery, removal of most lens epithelial cells is important; however this is almost impossible with the technique used routinely today. The cells then migrate and proliferate from the anterior capsule and equator of the lens capsule onto the posterior capsule (Marcantonio and Vrensen 1999).

To diminish after-cataract in children, most cataract surgeons perform posterior capsulorhexis at surgery (Zetterstrom 1997; Er et al. 2000; Ellis 2002; Jensen et al. 2002). It is usually performed through the main incision but through pars plana is also an option (Alexandrakis et al. 2002). In children, VAO will occur in almost 80% of eyes with an intact posterior capsule (Hosal & Biglan 2002). To hinder LECs from proliferating onto the vitreous surface, an anterior vitrectomy can be performed from the pars plana, after a pars plana posterior capsulotomy (Buckley et al. 1993) or through limbal incisions (Vasavada and Desai 1997).

An IOL implantation in the bag will decrease or prevent the formation of Sommerings's ring but it is then easier for the epithelial cells to migrate from the periphery to the centre of the pupil (Zetterstrom et al. 1996; Lambert et al. 2001). VAO with membrane formation is an unsolved problem in infants implanted with IOL and sometimes several interventions are needed (Kugelberg et al. 2006; Lundvall & Zetterstrom 2006).

It is advantageous to also give the smallest children IOL, compared to contact lenses which can be problematic for the parents to get on and off. The small ones does not cooperate what so ever, and the daily procedure can be traumatic both for the children and the parents. Contact lens use is also a common patogenetic cause of keratitis. And prolonged use of contact lenses can lead to corneal hypoxia and proliferation of vessels in the cornea.

IOL has also benefits over aphakic spectacles, which the child can fall on, becomes foggy when moving from outdoor to indoor, have to be cleaned often and the visual comfort can not be compared to that of lenses.

In conclusion, our results indicate that IOL implantation at primary cataract surgery helps prevent development of secondary glaucoma, but increases the number of interventions for VAO in infants. Many studies have found similar results, but more research might be required to strength/validate our hypothesis. The difficult question whether it is safe or not to implant IOL in infants needs further investigation. The need for development and evaluation of new devices to capture LECs at surgery with IOL will be beneficial because IOLs have many advantages over contact lenses and spectacles.

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